

Ser No.	Technical Specifications		Compliance
1	Technical Details/Specifications. The tech specifications and other details are tabulated below.		
1	<u>Hand Held Radio set with charger.</u>		
(a)	General	The portable radios should be lightweight capable of operating in conventional system in single location and automatic roaming to other areas of operation using IP based repeater network without manual intervention. Programmable buttons and an emergency button to seek help in critical situations must be common feature for all radios. The following additional features should also be available in the radios.	
(b)	Field Programmable	In-field programming changes allows the radio to easily adapt as the user's communication needs grow and change.	
(c)	Time-Out-Timer	Disallows inadvertent keying of the transmitter for extended periods of time, to prevent locking up one of the communication channels unnecessarily. The time can be programmed to best suit the application.	
(d)	Emergency button	Allows a user to obtain help in critical situations.	
(e)	Low Battery Alert	This alerts the user to recharge or replace the radio's battery before the excessive drain ceases operation.	
(f)	In-Built Blue tooth	The Radios should have in-built blue tooth for hands free operation	
(g)	The radios should be supplied with single unit rapid charger capable of charging Li-Ion batteries supplied and preferably meet IP 68 & 66 standards for submersibility.		
(h)	The Radios should conform to MIL standards 810 C,D,E,F,G & H for durability & reliability.		
(j)	The radio set should have provision of standard facility for installation of encryption device. Till SAG approved encryption is made available the vendor will provide commercial grade 256 Bit AES encryption. The commercial grade encryption will be deleted by the vendor at no extra cost at the time of fitment of SAG approved encryption which shall be procured separately. The OEM of the radio should give an undertaking that they will give details of interface for developing encryption in India whenever required. The developing agency in India will give NDA (Non disclosure agreement) to OEM. The OEM should be listed with DMR Association and model offered must have undergone interoperability certification by Technical working group (TWG).The Radio model offered should also inter-operate with existing Digital Radios held by Indian Army in Southern Command and various establishments. Bidder shall attach copies of supply orders from Army in Southern Command showing HHRS, Mobile/Base radio, Repeater and GIS software for verification.		
(k)	<u>Digital handheld Radio with Keypad and display.</u>		
(i)	Frequency Range	403-527 MHz	
(ii)	Number of Channels	1000	
(iii)	Channel Spacing	12.5 KHz or better	

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		(iv)	Frequency stability	± 0.5 ppm or better		
		(v)	Type of Emission & Protocol	Analog – FM 4 FSK Modulation complying to Open Standard Digital Protocol as defined by an international standards body like ETSI based on TDMA with 2 slot operation in simplex mode also.		
		(vi)	Type of Operation	Simplex Press to talk		
		(vii)	Type of Antenna	Rugged flexible aerial		
		(viii)	Power source	Li-ion rechargeable battery to meet the operating time of 8 Hours with 5:5:90 duty cycle. Battery capacity- 2400 mAH or more. One spare battery (capacity 2400mAH or more) for each set must be provided as per BOQ.(BIS approved)		
		(ix)	Display	The Radio should be supplied with 10 line Alphanumeric 2.4" colour display.		
		(x)	VOX facility	The radios should have built in VOX facility for Hands free operation.		
		(xi)	Weight	The weight with battery should be less than 400 gms.		
		(l)	GPS Based Tracking	Must have an inbuilt GPS with accuracy less than 5 Meters, to enable being tracked from Remote Control Station with appropriate system & user defined polling interval. The GPS receiver should be in Radio and not in antenna. The Radio should seamlessly operate with existing GIS tracking software Turbo Plus held with Southern Command. This will be demonstrated in field trials if required.		
		(m)	GIS	Radio should have Application Protocol Interface for development of software applications to provide Locations and messaging on PC / Console		
		(n)	Text Messaging	Should be capable of sending & Receiving Short Messages from Keypad and Pre-defined Messages list		
		(o)	Networking	IP based for features like Automatic Roaming etc.		
		(p)	Transmitter			
		(i)	RF Power Output	Programmable / switchable up to 4 Watt or higher		
		(ii)	Modulation limiting	+/- 2.5 KHz @12.5 KHz and +/- 5.0 KHz at 25 KHz		
		(iii)	FM Modulation	11 KOF 3 E for 12.5 KHz and 16 KOF3E for 25 KHz		
		(iv)	Digital Modulation	4 FSK Modulation 7K 60FXE		
		(v)	Frequency stability	± 0.5 ppm or better		
		(vi)	Conducted/ Radiated Emission	Better than 36 dBm below 1 GHz		
		(vii)	Audio Distortion	Less than 3% @ 1KHz		
		(viii)	FM Hum/ Noise	25 KHz : -45 dB or better 12.5 KHz : -40 dB or better		

Ser No.	Technical Specifications			Compliance
	(q)	Receiver		
		(i) Sensitivity	Analog : 0.16 μ V for 12 dB SINAD or better Digital : 0.14 μ V at 5% BER or better	
		(ii) (Adjacent Channel)	60 dB @ 12.5 KHz or better 70 dB @25 KHz or better	
		(iii) Inter modulation	60 dB as per ETSI stds.	
		(iv) Audio Response (6 dB / Octave pre-emphasis from 300-3000Hz)	.+1, -3 dB	
		(v) Audio Output	1W or higher	
		(vi) Spurious Rejection	60 dB or better	
		(vii) Environmental	Operating Temperature: -30 °C to + 60°C Storage Temperature : -40 °C to + 85°C Humidity : 90% at 50°C (per MIL standard 810 H)	
		(viii) Features	User Transmission Interruption provision for emergency broadcast Channel Announcement in all languages Automatic Audio enhancement for noisy area operation. Pre assigned Messages The Radio should have Dual Mic for Adaptive Noise Suppression/Cancellation & better voice quality. Contact list of more than 100 for SMS & Selective Calling Remote Radio Stun, Revive and Monitoring with authenticated killing feature to avoid intrusion by third party	
		(ix) Battery Charger	Single Unit Charger to suit the chemistry of the battery offered (BIS approved AC DC Adaptor).	
		(x) Programming accessories	Programming software to work through USB, Over the Air and programming cable. Wi-Fi Facility.	
		(xi) Literature	User manual with each radio set	
		(xii) Other Conditions	Bidder to indicate the customer care centers across India for after sales warranty support. OEM Service center in India is preferred. Bidder to upload NABL/ILAC report for Radio Parameters.The bids will be summarily rejected without these reports. Necessary OEM certificate for QR will be provided. Warranty for 24 months for radios and 12 months for accessories The firm should enclose DOT/WPC License for supplying radio equipment in India.	

PART II- ESSENTIAL DETAILS OF ITEMS

Ser No.	Technical Specifications		Compliance
3	Technical Details/Specifications. The tech specifications and other details are tabulated below.		
	2	Base Station.	
	(a)	General	The mobile Radio should be lightweight and compact operating in conventional system in single location and automatic roaming to other areas of operation using IP based repeater network without manual intervention. The Microprocessor control of key circuits should provide automatic operation of most internal functions, which allows for consistent performance and reliability. The radios should conform to MIL standards like 810 C, D & E standards. The mobile radios should have cables for interconnection to battery and mounting fixtures.
	(b)	Field Programmable	In-field programming changes allows the radio to easily adapt as the user's communication needs grow and change.
	(c)	Time-Out-Timer	Disallows inadvertent keying of the transmitter for extended periods of time, to prevent locking up one of the communication channels unnecessarily. The time can be programmed to best suit the application.
	(d)	Emergency button	Covert emergency signaling to allow users to send help signals to user defined individuals or groups in critical situations.
	(e)	In-Built Blue tooth	The Radios should have in-built blue tooth for hands free operation
	(f)	The Radios should conform to MIL standards 810 C,D,E & F for durability & reliability.	
	(g)	The radio set should have provision of standard facility for installation of encryption device. Till SAG approved encryption is made available the vendor will provide commercial grade 256 Bit AES encryption. The commercial grade encryption will be deleted by the vendor at no extra cost at the time of fitment of SAG approved encryption which shall be procured separately. The OEM of the radio should give an undertaking that they will give details of interface for developing encryption in India whenever required. The developing agency in India will give NDA (Non disclosure agreement) to OEM. The OEM should be listed with DMR Association and model offered must have undergone interoperability certification by Technical working group (TWG) of DMR Association. The Radio model offered should also inter-operate with existing Digital Radios held by Indian Army in Southern Command and various establishments. Bidder shall attach copies of supply orders from Army in Southern Command showing HHRS, Mobile/Base radio, Repeater and GIS software for verification.	
	(h)	Digital Mobile Radio with DTMF Microphone	
	(i)	Frequency Range	403-470 MHz
	(ii)	Number of Channels	1000 or higher
	(iii)	Channel Spacing	12.5 KHz or better
	(iv)	Frequency stability	± 0.5 ppm or better

PART II- ESSENTIAL DETAILS OF ITEMS

Ser No.	Technical Specifications			Compliance	
		(v)	Type of Emission & Protocol	Analog – FM	
				4 FSK Modulation complying to Open Standard Digital Protocol as defined by international standards body like ETSI based on TDMA with 2 slot operation in simplex mode also.	
		(vi)	Type of Operation	Simplex Press to talk	
		(vii)	Weight	Less than 2000 gms.	
		(viii)	Power source	Typical 13.8 V DC	
		(ix)	Display	Alphanumeric four line rolling colour display	
		(x)	Desirable Features		
		(aa)	GPS Based Tracking	Must have an inbuilt GPS with accuracy less than 5 Meters, to enable being tracked from Remote Control Station with appropriate system & user defined polling interval. The Radio should seamlessly operate with existing GIS tracking software Turbo Plus held with Southern Command. This will be demonstrated in field trials if required.	
		(ab)	GIS	Radio should have Application Protocol Interface for development of software applications to provide Locations and messaging on PC / Console	
		(ac)	Text Messaging	Should be capable of sending Short Messages from Keypad and Pre-defined Messages.	
		(ad)	Networking	IP based for features like Automatic Roaming etc.	
	(j)	Transmitter.			
		(i)	RF Power Output	Programmable / switchable up to 25 watts	
		(ii)	Modulation limiting	+/- 2.5 KHz @12.5 KHz and +/- 5.0 KHz at 25 KHz	
		(iii)	FM Modulation	11 KOF 3 E for 12.5 KHz and 16 KOF3E for 25 KHz	
		(iv)	Digital Modulation	4 FSK Modulation 7K 60FXE	
		(v)	Frequency Stability	± 0.5 ppm or better	
		(vi)	Conducted/ Radiated Emission	Better than 36 dBm below 1 GHz	
		(vii)	Audio Distortion	Less than 3% @ 1KHz	
		(viii)	FM Hum/ Noise	25 KHz : 45 dB or better 12.5 KHz : 40 dB or better	
	(k)	Receiver			
		(i)	Sensitivity	Analog : 0.30 µV for 12 dB SINAD or better	
				Digital : 0.25 µV at 5% BER or better	
(ii)	Selectivity (Adjacent Channel)	60 dB @ 12.5 KHz or better			

PART II- ESSENTIAL DETAILS OF ITEMS

Ser No.		Technical Specifications		Compliance		
				70 dB @25 KHz or better		
			(iii)	Inter modulation	65 dB as per ETSI stds.	
			(iv)	Audio Response (6 dB / Octave pre-emphasis from 300-3000Hz)	TIA603D	
			(v)	Audio Output	3 W internal or 7.5W external speaker 8 ohms	
			(vi)	Audio Distortion	3%	
			(vii)	Spurious Rejection	60 dB or better	
			(viii)	Environmental	Operating Temperature: -30 °C to + 60°C	
					Storage Temperature : -30 °C to + 60°C	
					Humidity : 90% at 50°C (per MIL standard 810 E)	
			(ix)	Features	User Transmission Interruption capability for emergency broadcast	
					Channel Announcement in all languages	
					Automatic Audio enhancement for noisy area operation	
					Pre assigned Messages	
					Contact list of more than 100 for SMS & Selective Calling	
					Remote Radio Stun, Revive and Monitoring with authenticated killing feature to avoid intrusion by third party	
			(x)	Accessories	Whip antenna with magnetic base for vehicle use	
					Ground Plane antenna with 30 meter connectorised RF Cable, RG 217 type, for fixed station.	
					AC/DC SMPS Power Supply 12V,10 Amp with Battery Revert	
			(xi)	Programming Accessories	Programming software to work through USB, Over the Air and programming cable. Wi Fi facility.	
			(xi)	Literature	User manual with each radio set	
			(x)	Other Conditions	Bidder to indicate the customer care centers across India for after sales warranty support. OEM Service center in India is proffered.	
					Bidder to upload NABL/ILAC report for Radio Parameters. The bids will be summarily rejected without these reports.	
					Necessary OEM certificate for QR will be provided.	
					Warranty for 24 months for radios and 12 months for accessories	
					The firm should enclose Valid DOT/WPC License for supplying radio equipment in India.	

Additional Terms and Conditions

1. **OEM Authorization:** A bid-specific OEM authorization letter on official OEM letterhead is required. Bids without authorization will be summarily rejected.
2. **Land and Border Undertaking:** The bidder must submit an undertaking regarding land and border issues and provide verification of the country of origin of the product. The buyer reserves the right to ask for copies of the Import/Bill of Entry for the last 6 months for verification purposes.
3. **Non-Blacklist Declaration:** A declaration from the bidder affirming that they are not blacklisted is mandatory.
4. **Mandatory Testing & Certification:** In compliance with the Latest Notification No.GSR 1131(E) Part XI dated 5th Sept 2017 from the Ministry of Department (Department of Telecommunication), mandatory testing and certification of telecommunication equipment (MTCTE) is required. The bidder must submit the MTCTE certificate for the offered product.
5. **Warranty:** The warranty period for the radio and repeater should be 2 years, and 1 year for accessories.
6. The OEM of the DMR Radios should be listed with DMR Association. The model offered should have undergone Interoperability test (IOP) by Technical Working Group (TWG) of DMR association. These documents shall be part of the bid. Bids without these documents will be summarily rejected.